Math 32 – Workshop #9

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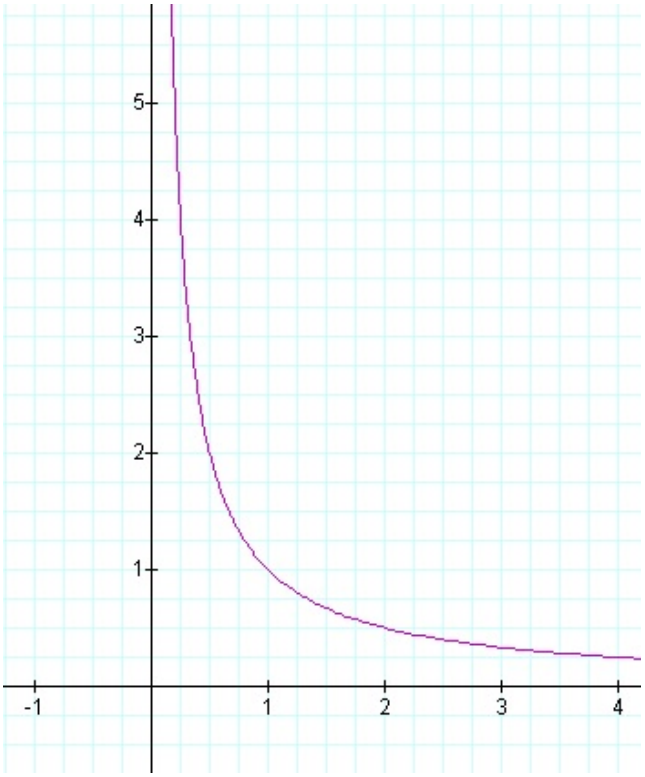
1. The graph of $\vec{\mathbf{r}}(t) = e^t\,\vec{\mathbf{i}} + e^{-t}\,\vec{\mathbf{j}}$ is given. Carefully sketch $\vec{\mathbf{r}}(t_0)$ and $\vec{\mathbf{r}}\,'(t_0)$ for $t_0 = 0$.



2. Find the parametric equations for the line that contains $(2, -3, 1)$ and $(5, 0, 4)$. Use your answer to give the parametric equations for the *line segment* that connects these points.

3. Find the parametric equations for the line tangent to $\vec{\mathbf{r}}(t) = \left\langle \dfrac{4}{t}, \sqrt{t+2}, 3t^2 \right\rangle$ at the point $(2, 2, 12)$.

4. Find the indicated derivative.

   (a) Find $\vec{\mathbf{r}}\,'(t)$ if $\vec{\mathbf{r}}(t) = \left\langle \cos(4t^2), e^{4t^2}, \dfrac{1}{4t^2} \right\rangle$

   (b) Find $\vec{\mathbf{r}}\,'(2)$ if $\vec{\mathbf{r}}(t) = \tan^{-1}(t)\,\vec{\mathbf{i}} + \sqrt{3t^2+4}\,\vec{\mathbf{j}} + \ln(3t+6)\,\vec{\mathbf{k}}$

5. Evaluate the integral.

   (a) $\displaystyle\int \left(\sec t \tan t\,\vec{\mathbf{i}} + \frac{t}{1+t^2}\,\vec{\mathbf{j}} + e^{16t}\,\vec{\mathbf{k}} \right) dt$

   (b) $\displaystyle\int_0^1 \left(\frac{t^3}{\sqrt{1+4t^4}}\,\vec{\mathbf{i}} + \frac{1}{1+t^2}\,\vec{\mathbf{j}} + te^{16t}\,\vec{\mathbf{k}} \right) dt$